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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/815,033

03/31/2004

Christophe J. Dorrer

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01/23/2007

Lucent Technologies Inc.

Docket Administrator - Room 3J-219

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Holmdel, NJ 07733-3030

EXAMINER

LE, THI Q

ART UNIT

PAPER NUMBER

2613

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/23/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.		Applicant(s)	
	10/815,033		DORRER ET AL.	
	Examiner		Art Unit	
	Thi Q. Le		2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2004 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/20/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Applicant's claim for domestic priority under 35 U.S.C. 119(e) is acknowledged.

Information Disclosure Statement

2. The information disclosure statements (IDS) filed on 3/31/2004, 9/29/2005 and 7/20/2005 were considered by the examiner.

Claim Objections

3. **Claims 1, 4 and 10** are objected to because of the following informalities:
4. **Claims 1, 4 and 10** objected because they recite terminology of proximity (i.e. the term "substantially"). The phrase, "substantially orthogonal", does not clearly define the state of polarization between successive bits.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. **Claims 1, 10, 15, 24, 27 and 29-30** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ito (US Patent # 6,650,846)** in view of **Tonello (US Patent # 6,480,552)**.

Consider **claim 1**, Ito clearly shows and discloses, a method comprising: modulating the output of an optical source to optically encode electronic data using phase modulation to generate an optical signal (read as, using the phase modulator 3, figure 13, to modulate the optical signal output from unit 2; figure 13); and alternating the polarization of the phase shift keyed optical signal using a modulator such that successive optical bits have substantially orthogonal polarizations to generate an alternate polarization Phase modulated signal (read as, using the polarization modulator 4, figure 13, to modulated the output from unit 3; such that, adjacent bits are mutually orthogonal in term of polarization; figure 13) (figure 13; column 10 lines 19-35). Ito fails to disclose, an optically encode electronic data using phase shift keying.

In related art, Tonello, disclose a modulator capable of performing Phase shift keying or Differential Phase shift keying (figure 1; column 1 lines 35-40).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Tonello with Ito. Phase shift keying and Differential Phase shift keying, both offer efficient bandwidth usage; thus allowing more data to be transmitted.

Consider **claim 10**, Ito clearly shows and discloses, a method comprising: precoding an electronic data signal (read as, an intensity modulator 2, modulating optical signal with NZR data; figure 13); modulating the output of an optical source using the precoded electronic data signal and differential phase shift keying between two optical bits separated by an even number of bit periods to generate an encoded optical signal (read as, phase modulator 3, modulating the optical signal using phase modulation scheme; figure 13); and alternating the polarization of the encoded optical signal using a modulator such that successive optical bits have substantially

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orthogonal polarizations to generate an alternating polarization phase modulated signal (read as, the polarization modulator 4, modulates the output from unit 3; such that, adjacent bits are mutually orthogonal in term of polarization; figure 13) (figure 13; column 10 lines 19-35). Ito fails to disclose, an optically encode electronic data using phase shift keying.

In related art, Tonello, disclose a modulator capable of performing Phase shift keying or Differential Phase shift keying (figure 1; column 1 lines 35-40).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Tonello with Ito. Phase shift keying and Differential Phase shift keying, both offer efficient bandwidth usage; thus allowing more data to be transmitted.

Consider **claim 15**, Ito clearly shows and discloses, an optical transmitter for transmission comprising: an optical source (read as, light source 1; figure 13), an optical data phase modulator (read as, phase modulator 3; figure 13) optically coupled to the optical source; and a polarization alternator (read as, polarization modulator 4; figure 13) optically coupled to the data modulator to provide polarization alternation of the output of the data modulator (figure 13; column 10 lines 19-35). Ito fails to disclose, an optically encode electronic data using phase shift keying.

In related art, Tonello, disclose a modulator capable of performing Phase shift keying or Differential Phase shift keying (figure 1; column 1 lines 35-40).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Tonello with Ito. Phase shift keying and Differential

Phase shift keying, both offer efficient bandwidth usage; thus allowing more data to be transmitted.

Consider **claim 24**, Ito clearly shows and discloses, an optical transmitter for transmission comprising: an optical source (read as, light source 1; figure 13), a precoder device for precoding an electronic data signal (read as, intensity modulator 2; figure 13); an optical phase-shift-keying data modulator (read as, phase modulator 3; figure 13) optically coupled to the laser source and driven by a precoded electronic data signal from the precoder device to produce an optical phase modulated signal wherein electronic data to be transmitted is optically encoded by the data modulator between two optical bits separated by an even number of bit periods; and a polarization alternator (read as, polarization modulator 4; figure 13) optically coupled to the data modulator to provide polarization alternation of the output of the data modulator (figure 13; column 10 lines 19-35). Ito fails to disclose, an optically encode electronic data using phase shift keying.

In related art, Tonello, disclose a modulator capable of performing Phase shift keying or Differential Phase shift keying (figure 1; column 1 lines 35-40).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Tonello with Ito. Phase shift keying and Differential Phase shift keying, both offer efficient bandwidth usage; thus allowing more data to be transmitted.

Consider **claim 27**, Ito clearly shows and discloses, an optical transmission system for transmitting signals comprising: an optical source (read as, light source 1; figure 13), an optical data phase modulator (read as, phase modulator 3; figure 13) optically coupled to the

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optical source; and a polarization alternator (read as, polarization modulator 4; figure 13) optically coupled to the data modulator to provide polarization alternation of the output of the data modulator (figure 13; column 10 lines 19-35). Ito fails to disclose, phase shift keying modulator.

In related art, Tonello, disclose a modulator capable of performing Phase shift keying or Differential Phase shift keying (figure 1; column 1 lines 35-40).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Tonello with Ito. Phase shift keying and Differential Phase shift keying, both offer efficient bandwidth usage; thus allowing more data to be transmitted.

Consider **claim 29**, Ito clearly shows and discloses, an optical transmission system for transmission comprising: an optical source (read as, light source 1; figure 13); a precoder device (read as, intensity modulator 2; figure 13) for precoding an electronic data signal; an optical data phase modulator (read as, phase modulator 3; figure 13) optically coupled to the laser source and driven by a precoded electronic data signal from the precoder device to produce an optical phase modulated signal wherein electronic data to be transmitted is optically encoded by the data modulator between two optical bits separated by an even number of bit periods; and a polarization alternator (read as, polarization modulator 4; figure 13) optically coupled to the data modulator to provide polarization alternation of the output of the data modulator (figure 13; column 10 lines 19-35). Ito fails to disclose, phase-shift-keying modulator.

In related art, Tonello, disclose a modulator capable of performing Phase shift keying or Differential Phase shift keying (figure 1; column 1 lines 35-40).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Tonello with Ito. Phase shift keying and Differential Phase shift keying, both offer efficient bandwidth usage; thus allowing more data to be transmitted.

Consider **claim 30**, Ito clearly shows and discloses, an apparatus for generating an polarization alternating phase modulated optical signal comprising: means for encoding electronic data using phase modulation to generate an optical signal (read as, phase modulator 3; figure 13); and modulator means for alternating the polarization of the optical signal to generate an alternate polarization phase modulated signal (read as, polarization modulator 4; figure 13) (figure 13; column 10 lines 19-35). Ito fails to disclose, phase-shift-keying/differential phase-shift-keying modulator.

In related art, Tonello, disclose a modulator capable of performing Phase shift keying or Differential Phase shift keying (figure 1; column 1 lines 35-40).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Tonello with Ito. Phase shift keying and Differential Phase shift keying, both offer efficient bandwidth usage; thus allowing more data to be transmitted.

9. **Claims 2-4 and 16-17** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ito (US Patent # 6,650,846)** in view of **Tonello (US Patent # 6,480,552)** and further in view of **Fujiwara et al. (US PGPub 2003/0161638)**.

Consider **claims 2 and 3**, and as applied to **claim 1 above**, Ito as modified by Tonello disclose the invention as described above; Ito differs from the claimed invention in that the

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combination of a phase modulator and a polarization modulator provide a polarization alternation optical signal, wherein the combination of phase and polarization modulators are driving by a sinusoidal voltage and train of square pulses (Ito, figure 15).

In related art, Fujiwara et al. disclose phase modulator (read as, phase adjuster 143, provided in a polarization scrambler which can generate a polarization alternating optical signal; figure 24) (figure 24A; paragraph 0202-0203).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Fujiwara et al. with Ito. Since, Fujiwara et al. disclose a device with can perform polarization alternation of optical signal with less components; thus, reducing the overall cost of the transmission system.

Consider **claim 4**, and **as applied to claim 1 above**, Ito as modified by Tonello disclose the invention as described above; Ito differs from the claimed invention in that the combination of a phase modulator and a polarization modulator provide a polarization alternation optical signal, wherein the combination of phase and polarization modulators are driving by a sinusoidal voltage and train of square pulses (Ito, figure 15); and the polarization entering the combination is not at a predetermined angle.

In related art, Fujiwara et al. disclose, wherein the optical signal is launched into the modulator (read as, polarization scrambler; figure 22A) having a polarization oriented at a predetermined angle (read as, the polarization entering the polarization scrambler is oriented at 45 degrees) such that the polarization of successive optical bits of the output signal are substantially orthogonal (figure 22A; paragraphs 0194, 0198).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Fujiwara et al. with Ito. Since, Fujiwara et al. disclose a device with can perform polarization alternation of optical signal with less components; thus, reducing the overall cost of the transmission system.

Consider **claims 16 and 17**, and **as applied to claim 15 above**, claims 16 and 17 are rejected for the same reason as claim 2 and 3 above (note, the train of square pulse 102, Ito-figure 15, is running at half the bit rate).

10. Claims **5-9, 12-13, 18-23, 25-26 and 28** rejected under 35 U.S.C. 103(a) as being unpatentable over **Ito (US Patent # 6,650,846)** in view of **Tonello (US Patent # 6,480,552)** and further in view of **Yao (US Patent# 5,654,818)**.

Consider **claim 5**, and **as applied to claim 1 above**, Ito as modified by Tonello disclose the invention as described above; Ito differs from the claimed invention in that the combination of a phase modulator and a polarization modulator provide a polarization alternation optical signal, wherein the combination of phase and polarization modulators are driving be a sinusoidal voltage and train of square pulses (Ito, figure 15).

In related art, Yao discloses, a Mach-Zehnder modulator (read as, Mach-Zehnder modulator of figure 4) including a polarization rotation device (read as, polarization rotator 52; figure 4) in at least one arm (figure 4; column 5 lines 19-26).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Yao with Ito. Since many components of the Mach-Zehnder modulator can be produce by integrated fabrication techniques, which allow for production of small, inexpensive, highly reliable "integrated optic" devices.

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Consider **claim 6**, and **as applied to claim 1 above**, Ito as modified by Tonello and further modified by Yao disclose the invention as described above, except for, wherein the polarization rotation device is a half-wave plate. The Examiner takes official notice that it is well known in the art that a half-wave plate is use for polarization rotation of 90 degrees. Since Ito as modified by Yao disclose a polarization rotator 52, Yao-figure 4, which is use for rotation the polarization of the input optical signal by 90 degrees; it would have been obvious for a person of ordinary skill in the art to know that the polarization device 52 can be a half-wave plate. Since using a half-wave plate for polarization rotation is simple and requires little components; thus, reducing the cost of the system.

Consider **claims 7 and 8**, and **as applied to claim 15 above**, claims 7 and 8 are rejected for the same reason as claim 2 and 3 above (note, the train of square pulse 102, Ito-figure 15, is running at half the bit rate).

Consider **claim 9**, Ito discloses, a method for transmission of phase modulated polarization alternating signal comprising: using an electronic data signal to drive a modulator (read as, combination phase modulator 3 and polarization modulator 4; figure 13) to provide simultaneous polarization alternation and optical data encoding by phase shift keying to generate an polarization alternating phase modulated signal (read as, the combination phase modulator 3 and polarization modulators 4, modulate the optical signal; such that, adjacent bits are mutually orthogonal in term of polarization; figure 13). Ito fails to disclose, wherein the modulator is a Mach-Zehnder modulator having a polarization rotation device in at least one arm; and phase-shift-keying/differential phase-shift-keying modulator.

In related art, Yao discloses, a Mach-Zehnder modulator (read as, Mach-Zehnder modulator of figure 4) having a polarization rotation device (read as, polarization rotator 52; figure 4) in at least one arm (figure 4; column 5 lines 19-26).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Yao with Ito. Since many components of the Mach-Zehnder modulator can be produce by integrated fabrication techniques, which allow for production of small, inexpensive, highly reliable “integrated optic” devices.

In related art, Tonello, disclose a modulator capable of performing Phase shift keying or Differential Phase shift keying (figure 1; column 1 lines 35-40).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Tonello with Ito. Phase shift keying and Differential Phase shift keying, both offer efficient bandwidth usage; thus allowing more data to be transmitted.

Consider **claim 12**, Ito discloses, a method of polarization alternating phase modulated signal transmission comprising: preceding an electronic data signal (read as, an intensity modulator 2, modulating optical signal with NZR data; figure 13); using the precoded electronic data signal to drive a modulator (read as, the combination phase modulator 3 and polarization modulators 4, modulate the optical signal; such that, adjacent bits are mutually orthogonal in term of polarization; figure 13) to provide simultaneous polarization alternation and optical data encoding by phase modulation between two optical bits separated by an even number of bit periods to generate an polarization alternating phase modulated signal. Ito fails to disclose,

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wherein the modulator is a Mach-Zehnder modulator having a polarization rotation device in at least one arm; and phase-shift-keying/differential phase-shift-keying modulator.

In related art, Yao discloses, a Mach-Zehnder modulator (read as, Mach-Zehnder modulator of figure 4) having a polarization rotation device (read as, polarization rotator 52; figure 4) in at least one arm (figure 4; column 5 lines 19-26).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Yao with Ito. Since many components of the Mach-Zehnder modulator can be produce by integrated fabrication techniques, which allow for production of small, inexpensive, highly reliable “integrated optic” devices.

In related art, Tonello, disclose a modulator capable of performing Phase shift keying or Differential Phase shift keying (figure 1; column 1 lines 35-40).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Tonello with Ito. Phase shift keying and Differential Phase shift keying, both offer efficient bandwidth usage; thus allowing more data to be transmitted.

Consider **claim 13**, and as applied to claim 12 above, claim 13 is rejected for the same reason as claim 6 above.

Consider **claim 18**, and as applied to claim 15 above, Ito as modified by Tonello disclose the invention as described above, except for, wherein the polarization alternator is a modified Mach-Zehnder modulator having a polarization rotation device in one arm.

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In related art, Yao discloses, a Mach-Zehnder modulator (read as, Mach-Zehnder modulator of figure 4) having a polarization rotation device (read as, polarization rotator 52; figure 4) in at least one arm (figure 4; column 5 lines 19-26).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Yao with Ito. Since many components of the Mach-Zehnder modulator can be produce by integrated fabrication techniques, which allow for production of small, inexpensive, highly reliable “integrated optic” devices.

Consider **claims 19 and 20**, and **as applied to claim 18 above**, claims 19 and 20 are rejected for the same reason as claim 2 and 3 above (note, the train of square pulse 102, Ito-figure 15, is running at half the bit rate).

Consider **claim 21**, and **as applied to claim 15 above**, Ito as modified by Tonello disclose the invention as described above, except for, wherein the polarization alternator is a Mach-Zehnder modulator having two complementary output ports, and wherein the apparatus further comprises a polarization beam combiner for combining outputs from the two output ports of the Mach-Zehnder modulator.

In related art, Yao discloses, a Mach-Zehnder modulator (read as, Mach-Zehnder modulator of figure 3) having two complementary output ports (read as, output ports 26 and 28; figure 3), and wherein the apparatus further comprises a polarization beam combiner (read as, polarization beam combiner 12'; figure 3) for combining outputs from the two output ports of the Mach-Zehnder modulator (figure 3; column 6 lines 1-18).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Yao with Ito. Since many components of the Mach-

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Zehnder modulator can be produce by integrated fabrication techniques, which allow for production of small, inexpensive, highly reliable “integrated optic” devices.

Consider **claims 22 and 23**, and as **applied to claim 21 above**, claims 22 and 23 are rejected for the same reason as claim 2 and 3 above (note, the train of square pulse 102, Ito-figure 15, is running at half the bit rate).

Consider **claim 25**, Ito discloses, an optical transmitter for polarization alternating phase modulated signal transmission comprising: an optical source (read as, light source 1; figure 13); and the combined phase modulator 3 and polarization modulator 4 to provide polarization alternation and optical data encoding of an optical signal using phase shift keying. The Examiner takes Official Notice that it is well known in the art, for a phase modulator to be arranged to perform phase shift keying or differential phase shifting keying, for the same reason as indicated in claim 1. Ito fails to disclose, a Mach-Zehnder (MZ) modulator device optically coupled to the laser source having a polarization rotation device in one arm; and drive circuitry coupled to the MZ modulator device to drive a MZ modulator; and phase-shift-keying/differential phase-shift-keying modulator.

In related art, Yao discloses, a Mach-Zehnder (MZ) modulator (read as, Mach-Zehnder modulator of figure 4) device optically coupled to the laser source having a polarization rotation device in one arm (read as, polarization rotator 52; figure 4); and drive circuitry (read as, signal source 20; figure 4) coupled to the MZ modulator device to drive a MZ modulator (figure 4; column 5 lines 19-26).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Yao with Ito. Since many components of the Mach-

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Zehnder modulator can be produce by integrated fabrication techniques, which allow for production of small, inexpensive, highly reliable “integrated optic” devices.

In related art, Tonello, disclose a modulator capable of performing Phase shift keying or Differential Phase shift keying (figure 1; column 1 lines 35-40).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Tonello with Ito. Phase shift keying and Differential Phase shift keying, both offer efficient bandwidth usage; thus allowing more data to be transmitted.

Consider **claim 26**, Ito discloses, an optical transmitter for polarization alternating phase modulated signal transmission comprising: an optical source (read as, light source 1; figure 13); a precoder (read as, intensity modulator 2; figure 13); and the combined phase modulator 3 and polarization modulator 4 to provide polarization alternation and optical data encoding of an optical signal using phase shift keying. The Examiner takes Official Notice that it is well known in the art, for a phase modulator to be arranged to perform phase shift keying or differential phase shifting keying, for the same reason as indicated in claim 1. Ito fails to disclose, a Mach-Zehnder (MZ) modulator device optically coupled to the laser source having a half-wave plate in one arm; and drive circuitry coupled to the MZ modulator device to drive a MZ modulator; and phase-shift-keying/differential phase-shift-keying modulator.

In related art, Yao discloses, a Mach-Zehnder (MZ) modulator (read as, Mach-Zehnder modulator of figure 4) device optically coupled to the laser source having a polarization rotation device in one arm (read as, polarization rotator 52; figure 4); and drive circuitry (read as, signal

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source 20; figure 4) coupled to the MZ modulator device to drive a MZ modulator (figure 4; column 5 lines 19-26).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Yao with Ito. Since many components of the Mach-Zehnder modulator can be produce by integrated fabrication techniques, which allow for production of small, inexpensive, highly reliable “integrated optic” devices.

In related art, Tonello, disclose a modulator capable of performing Phase shift keying or Differential Phase shift keying (figure 1; column 1 lines 35-40).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Tonello with Ito. Phase shift keying and Differential Phase shift keying, both offer efficient bandwidth usage; thus allowing more data to be transmitted.

Consider **claim 28**, Ito discloses, an optical transmission system for polarization alternating phase modulated signal transmission comprising: an optical source (read as, light source 1; figure 13); and the combined phase modulator 3 and polarization modulator 4 to provide polarization alternation and optical data encoding by phase shift keying to generate an APol-PSK signal. The Examiner takes Official Notice that it is well known in the art, for a phase modulator to be arranged to perform phase shift keying or differential phase shifting keying, for the same reason as indicated in claim 1. Ito fails to disclose, a modulator means having a polarization rotation device; and phase-shift-keying/differential phase-shift-keying modulator.

In related art, Yao discloses, a modulator (read as, Mach-Zehnder modulator of figure 4) means having a polarization rotation device (read as, polarization rotator 52; figure 4).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Yao with Ito. Since many components of the Mach-

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Zehnder modulator can be produce by integrated fabrication techniques, which allow for production of small, inexpensive, highly reliable "integrated optic" devices.

In related art, Tonello, disclose a modulator capable of performing Phase shift keying or Differential Phase shift keying (figure 1; column 1 lines 35-40).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Tonello with Ito. Phase shift keying and Differential Phase shift keying, both offer efficient bandwidth usage; thus allowing more data to be transmitted.

11. **Claims 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Ito (US Patent # 6,650,846)** in view of **Tonello (US Patent # 6,480,552)** and further in view of **Munks et al. (US Patent# 6,842,287)**.

Consider **claim 11**, and **as applied to claim 10 above**, Ito as modified by Tonello disclose the invention as described above, except for, demodulating the APol-DPSK signal using an even bit delay line interferometer.

In related art, Munks et al. disclose, demodulating the APol-DPSK signal using an even bit delay line interferometer (read as, a Mach-Zehnder interferometer receiver wherein the path length between the two arms differs by N bit lengths; N could be an even number) (figure 1; column 2 lines 24-52).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Munks et al. with Ito. Since the invention as disclosed by Munks et al. allows common mode noise reduction at the receiver.

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12. **Claim 14** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Ito (US Patent # 6,650,846)** in view of **Tonello (US Patent # 6,480,552)** and further in view of **Yao (US Patent# 5,654,818)** and further in view of **Munks et al. (US Patent# 6,842,287)**.

Consider **claim 14**, and as applied to **claim 12** above, claim 14 is rejected for the same reason as claim 11 above.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a) Betti et al.; 5,416,628
- b) Blow, Keith James; 5,757,912
- c) Townsend, Paul David; 5,953,421
- d) Hakimi et al.; 2003/0215173
- e) Lauzon, Jocelyn; 2004/0165808
- f) Mauro et al.; 2004/0227649
- g) Kim et al.; 2004/0252929
- h) Yano, Yutaka; 2005/0100347
- i) Yano, Yutaka; 7,024,123
- j) Van Der Tol, Johannes Jacobus Gerardus Maria; 5,708,734
- K) Bergano, Neal S.; 2003/0118350

14. Any response to this Office Action should be **faxed to (571) 273-8300 or mailed to:**

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15. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Thi Le whose telephone number is (571) 270-1104. The Examiner can normally be reached on Monday-Friday from 7:30am to 5:00pm.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 703-305-3028.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist/customer service whose telephone number is (571) 272-2600.

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